

LIBRARY OF THE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

590.5

FI

v. 42

cop. 3



NATURAL HISTORY.
SURVEY

1.157

FIELDIANA: ZOOLOGY

A Continuation of the
ZOOLOGICAL SERIES
of
FIELD MUSEUM OF NATURAL HISTORY

VOLUME 42

NATURAL HISTORY SURVEY

FEB 11 1971

LIBRARY



FIELD MUSEUM OF NATURAL HISTORY
CHICAGO, U.S.A.

I
.42
op. 3

NHS

TABLE OF CONTENTS

	PAGE
1. Philippine Zoological Expedition 1946-1947. Poilippine Snails of the Family Endodontidae. By Alan Solem	1
2. Philippine Zoological Expedition 1946-1947. New Birds from the Philippines. By Austin L. Rand and D. S. Rabor	13
3. Philippine Zoological Expedition 1946-1947. A Synopsis of Philippine Endomychidae (Coleoptera). By H. F. Strohecker	19
4. Philippine Zoological Expedition 1946-1947. Notes on Philippine Mallophaga, I. Species from Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Gruiformes and Charadriiformes. By K. C. Emerson and Ronald A. Ward	49
5. Philippine Zoological Expedition 1946-1947. Stag Beetles (Coleoptera: Lucanidae). By Bernard Benesh	63
6. Philippine Zoological Expedition 1946-1947. Stoneflies from the Philippines (Plecoptera). By Stanley G. Jewett, Jr.	77
7. Philippine Zoological Expedition 1946-1947. Camptopterohelea. A New Genus of Ceratopogonidae from the Philippines (Diptera). By W. W. Wirth and A. A. Hubert	89
8. Philippine Zoological Expedition 1946-1947. On Some Parasitic Laelapoid Mites (Acarina) of the Philippines. By Mercedes D. Delfinado .	93
9. Philippine Zoological Expedition 1946-1947. A New Genus and Species of Cantacaderine Lace-bug from the Philippines (Hemiptera) Tingidae). By Carl J. Drake	115
10. Philippine Zoological Expedition 1942-1947. New and Interesting Odonata from the Philippines. By Maurits A. Lieftinck	119
11. Philippine Batflies of the Family Nycteribiidae (Diptera, Pupipara). By Oskar Theodor	151

FIELDIANA · ZOOLOGY

Published by

CHICAGO NATURAL HISTORY MUSEUM

Volume 41

APRIL 26, 1957

No. 1

PHILIPPINE ZOOLOGICAL EXPEDITION

1946-1947

PHILIPPINE SNAILS OF THE FAMILY ENDODONTIDAE

ALAN SOLEM

ASSISTANT CURATOR, LOWER INVERTEBRATES

INTRODUCTION

A new endodontid snail in Chicago Natural History Museum, collected on Mindanao by the Philippine Zoological Expedition, 1946-47, has prompted a review of the synonymy, generic position, and distribution of the Philippine Island Endodontidae. This paper is a by-product of a survey of the genera of Indo-Pacific Endodontidae undertaken at the University of Michigan in 1954-56. Completion of the major project has been delayed, and publication, at this time, of data on the few Philippine species seems worth while.

Dr. Henry van der Sehalie of the University of Michigan Museum of Zoology (hereafter UMMZ) permitted me to study material under his charge, and Dr. Fritz Haas of Chicago Natural History Museum (hereafter CNHM) aided this study in many ways. The excellent illustrations are the work of Chicago Natural History Museum Staff Artist, E. John Pfiffner.

SYSTEMATICS

The family Endodontidae probably contains the most primitive of the living sigmurethrous pulmonates. Predominately a southern hemisphere taxon, only in New Zealand, southern Australia, Tasmania, New Caledonia, and on the islands of the Pacific Ocean have the endodontids undergone such extensive adaptive radiations that they form an important part of the mollusean fauna. South Africa,

No. 819

1

THE LIBRARY OF THE

southern South America, and the eastern portion of North America are centers of secondary development. In other regions endodontids seem to have been replaced by the more advanced "zonitid" families. Indonesia and Melanesia are a transition zone between the dominance of the zonitid and dominance of the endodontid snails. Melanesia has a varied endodontid fauna, but in Java and the Philippines a few relict endodontids contrast with an extensive radiation of zonitids. Apparently the Philippines are at or near the western limit of endodontid distribution.

The four Philippine endodontids are less than 2 mm. in diameter. Because of their small size and delicate sculpture, locality records are few and the systematic position has not been determined. The generic units adopted here are based on data contained in an unpublished survey of the endodontid snails of Pacific oceanic islands. Some explanatory data as to generic criteria and synonymy are presented, but full discussion at the generic level is reserved for another time. Comparative measurements of the four species are given in Table 1. All measurements were taken by use of an ocular micrometer under 9x magnification and then converted into millimeters.

KEY TO THE PHILIPPINE ISLAND ENDODONTIDAE

1. Apical sculpture of radial ribs only..... *(Discocharopa)* 2
- Apical sculpture of spiral lines or ribs..... 3
2. Aperture toothless; umbilicus contained 2.5 times in diameter.
 Discocharopa aperta Moellendorff
- Aperture with lamellae; umbilicus contained 3.5 times in diameter.
 Discocharopa werneri, new. sp.
3. Post-apical whorls with radial ribs; aperture with one parietal lamella and three palatal denticles..... *Beilania philippinensis* Semper
- Post-apical whorls spirally striate; lip thickened; two parietal lamellae.
 Stenopilis coarctata Moellendorff

Genus *Discocharopa* Iredale, 1913

Type species.—*Charopa exquisita* Iredale, 1913.

Discocharopa includes several minute, usually widely umbilicate species (diameter less than 1.6 mm., umbilicus contained 2-2.7 times in the diameter). The sculpture is composed of radial ribs only. Specimens referable to *Discocharopa* have been previously reported from eastern Australia, Tasmania, the Kermadec Islands, the Bismarck Islands, Ambon, Celebes, and Java. A new species from the New Hebrides will be described elsewhere. Examination of specimens (UMMZ) showed that *Patula aperta* Moellendorff from Luzon is a *Discocharopa*, and a small, toothed shell from

Mindanao (CNHM collection) is here tentatively referred to *Discocharopa*.

Discocharopa aperta Moellendorff. Figure 1, *a-d*.

Patula aperta Moellendorff, 1888, Nachr.-Bl. deut. Malak. Gesell., 1888, (5-6), p. 89—Montalban, Rizal, Luzon, Philippine Islands; Pilsbry, 1892, Man. Conch., (2), 8: 80-81, pl. 37, figs. 35-37; Moellendorff, 1898, Abh. Naturf. Ges. Görlitz, 22: 88—Luzon, Leyte, Calamianes.

Pyramidula aperta Faustino, 1930, Philippine Jour. Sci., 42, (1), p. 110.

Range.—Luzon, Leyte, Calamianes, Catanduanes.

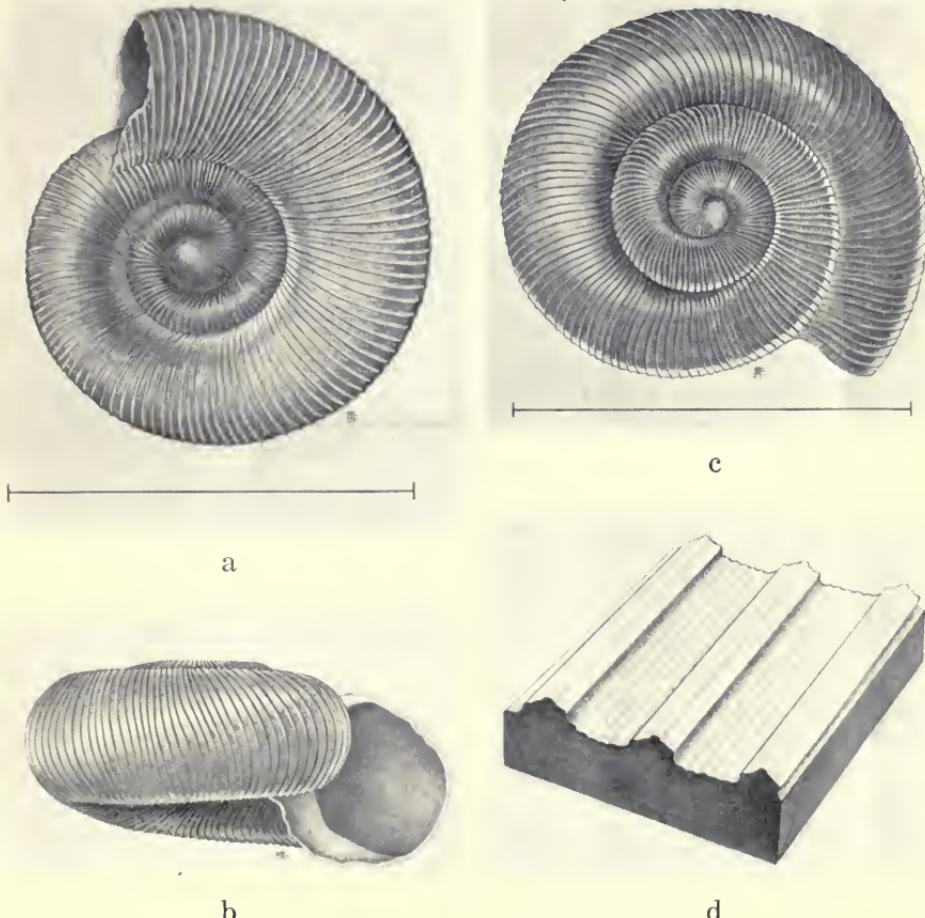


FIG. 1. *Discocharopa aperta* Moellendorff, UMMZ 136635. *a*, basal view; *b*, side view; *c*, top view; *d*, diagram of microsculpture (greatly enlarged). Scale lines=1 mm.

Material.—Montalban, Rizal, Luzon (UMMZ 136635 ex Walker, Rolle, Oberwimmer); Manila, Luzon (UMMZ); Catanduanes (CNHM 57193 ex Webb, Quadras).

Remarks.—The toothless, widely umbilicated *D. aperta* is most closely related to the Indonesian *D. microdisca* van Benthem Jutting, 1951, reported from Java, Celebes, and Ambon. In *D. microdisca* the spire is more elevated and the umbilicus slightly wider than in *D. aperta*. No Indonesian specimens were available, however, and it is not impossible that *microdisca* and *aperta* will prove to be synonymous.

***Discocharopa wernerii*, new species. Figure 2, a-d.**

Holotype.—Chicago Natural History Museum no. 34869.

Type locality.—Lake Linau, north slope of Mount Apo, Davao Province, Mindanao, Philippine Islands, at 7,900 feet elevation, in moss. Collected by Floyd G. Werner, 1946.

Paratype.—CNHM no. 57194. East slope of Mount McKinley, Davao Province, Mindanao, at 3,000 feet elevation. Collected by Harry Hoogstraal, August 25, 1946. Figured paratype unfortunately lost after the illustrations had been prepared.

Diagnosis.—A minute, radially ribbed endodontid with nine apertural lamellae, the larger parietal one bifurcate posteriorly.

Description.—Shell minute, discoidally flattened, spire only slightly elevated. Whorls four, increasing slowly and regularly in size, body whorl evenly rounded. Sutures deeply impressed, with a distinct shoulder almost directly above the sutural line. Apical whorls $1\frac{1}{2}$, sculptured with very weak radial ribs. Remaining whorls with low radial ribs, about 107 on the body whorl of the paratype. Interstices with microscopic riblets. Umbilicus open, contained about 3.5 times in the diameter. Aperture crescentic, with eleven lamellae. Parietal wall with a large, medial, bifurcate lamella, and a smaller one just above the junction of the basal lip and the columella. Basal portion of lip with two large, moderately thickened and twisted lamellae. Outer apertural wall with seven slender, parallel, slightly recessed lamellae. Color hyaline, shining. Diameter 1.5–1.6 mm., height 0.9 mm.

Comparisons.—The combination of radially ribbed apex and toothed aperture at once separates *D. wernerii* from any other Philippine or Indonesian endodont. The other species with radially ribbed apex, *D. aperta* Moellendorff, is toothless and has a much wider

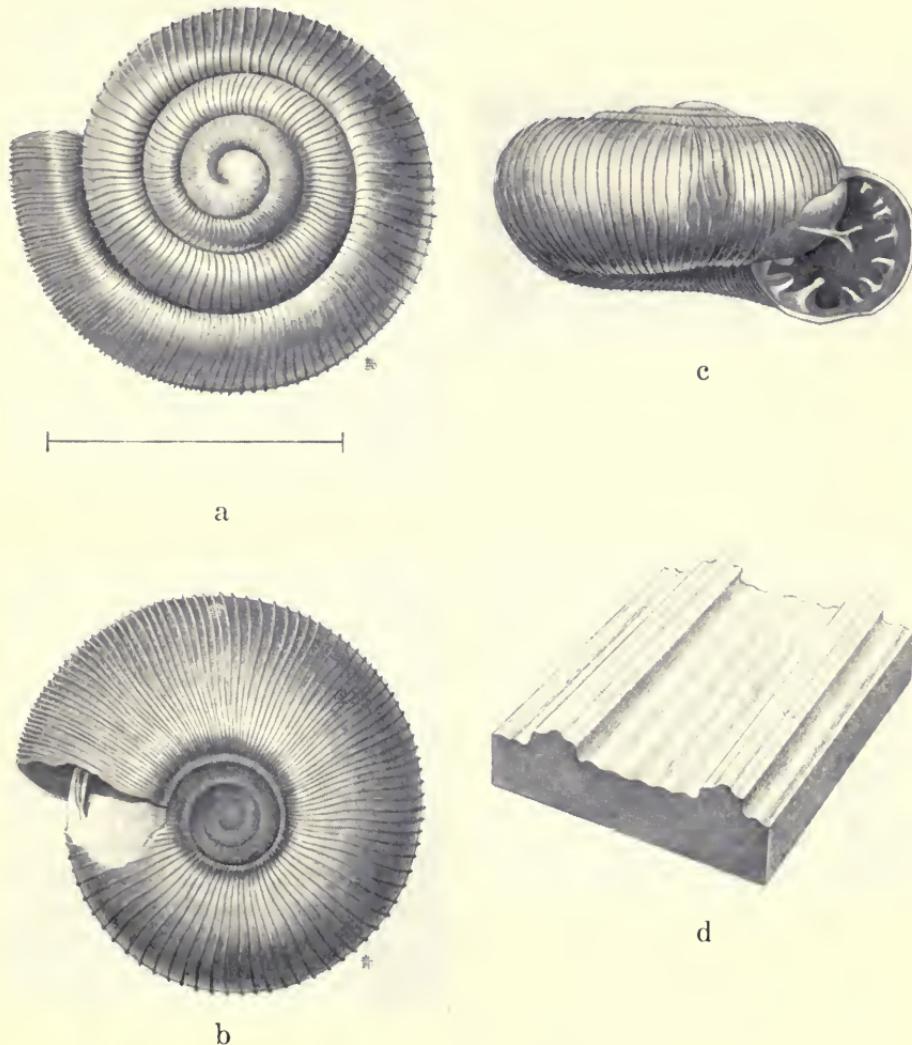


FIG. 2. *Discocharopa werneri*, n. sp., CNHM 57194. Paratype. *a*, top view; *b*, basal view; *c*, side view; *d*, diagram of microsculpture (greatly enlarged). Scale line=1 mm. Specimen lost in handling.

umbilicus; the species with apertural teeth all have spirally striate apices.

Remarks.—The generic position of *D. werneri* is uncertain. The combination of radially ribbed apex, toothed aperture, and rather narrow umbilicus suggested the Polynesian-New Zealand *Thaumatodon-Ptychodon* complex, rather than the toothless, widely um-

TABLE 1.—PHILIPPINE ENDODONTIDAE

	Height	Diameter	H/D	Whorls	Umbilicus	D/U
<i>Discocharopa wernerii</i>						
Holotype.....	0.90	1.54	0.58	3 $\frac{7}{8}$	0.45	3.42
Paratype.....	0.90	1.61	0.56	4	0.45	3.58
<i>D. aperta</i>	0.42	0.94	0.45	2 $\frac{7}{8}$	0.35	2.58
UMMZ 136635	0.45	1.06	0.43	3	0.42	2.52
	0.49	1.10	0.45	3 $\frac{1}{4}$	0.49	2.25
<i>Stenopylis coarctata</i>	0.65	1.64	0.40	3 $\frac{1}{2}$	0.65	2.52
(CNHM 55189)	0.65	1.61	0.40	3 $\frac{1}{2}$	0.65	2.48
<i>Beilania philippinensis</i>	0.81	1.61	0.50	3 $\frac{3}{8}$	0.45	3.58
(CNHM 46460)	0.84	1.64	0.51	3 $\frac{1}{2}$	0.52	3.16
	0.87	1.80	0.48	3 $\frac{5}{8}$	0.58	3.12

bilobate *Discocharopa*. *Ptychodon* and *Thaumatodon* are much larger, have less deeply impressed sutures, and a distinct flammulated color pattern, whereas *Discocharopa* is the same size and has the same "glassy" color pattern as *D. wernerii*.

Examination of all the described species of *Discocharopa* showed that those near the limits of distribution differed from the more "typical" *microdisca-aperta* in several respects. The Tasmanian species and *D. planorbulina* Tate from Queensland and central Australia have a narrower umbilicus and more strongly rounded whorls, while the type species, *D. exquisita* Iredale from the Kermaidec Islands (UMMZ 138279), has a strong parietal lamella located one-third of a whorl behind the aperture. Since the Philippines represent the northwestern limit of distribution, acceptance of *D. wernerii* as an aberration from "typical" *Discocharopa* is more satisfactory than associating *wernerii* with a Polynesian genus. A possibly similar distribution pattern is seen in the frog genus *Rhacophorus*, where a very wide-ranging species, *R. leucomystax* Boie, is found throughout the islands, and two specialized species, *R. lissobrachius* Inger and *R. emembranatus* Inger, occur on Mindanao (see Inger, 1954, pp. 376-384, 390-393).

Discocharopa wernerii is named after the collector of the holotype, Mr. Floyd Werner, formerly Assistant in the Department of Zoology, Chicago Natural History Museum.

Genus *Beilania* Preston, 1913

Type species.—*Beilania inopina* Preston, 1913.

The minute size, flat spire, evenly rounded body whorl, spirally striate apex, and one or two parietal lamellae characterize *Beilania* and easily separate it from other endodontids. The Austro-Melanesian *Mocella* has a spirally striate apex but is much larger and has

a partially flattened body whorl and no lamellae. The many Micronesian endodonts probably were derived from *Beilania* but are larger and highly developed in sculpture, coloration, and lamellar configurations.

Beilania contains the genotype from near Obi in the Moluccas, *B. demani* Tapparone-Canevari from the Aru Islands, and *B. philippinensis* Semper from the Philippines and Indonesia. Possibly *Ptychodon microglyphis* Rensch, 1937, and *P. macroglyphis* Rensch, 1937, from the Bismarcks may also belong to *Beilania*.

B. philippinensis differs from the other species of *Beilania* in having only one parietal lamella and a relatively narrow umbilicus.

Beilania philippinensis Semper. Figure 3, *a-d*.

Endodonta philippinensis Semper, 1874, Reisen im Archipel Philippinen, (2), 3: 140—Antipolo, Manila, Luzon; Moellendorff, 1887, Jahr. deut. Malak. Gesell., 14: 272—Cebu; 1891, Ber. Sencken. Naturf. Gesell., 1891: 263—264—Banda and Saparua, Moluccas; Faustino, 1930, Philippine Jour. Sci., 42, (1), p. 110—Mindanao.

Patula (Endodonta) philippinensis Pilsbry, 1892, Man. Conch., (2), 8: 82—83, pl. 37, figs. 38—40.

Endodonta celebica Sarasin and Sarasin, 1899, Naturg. Insel Celebes, 2: 175, pl. 25, fig. 257—Vulkan Soputan, Celebes, at 1,150 meters elevation.

Charopa kobelti Boettger, 1908, Nachr.-Bl. deut. Malak. Gesell., 40, (4), pp. 181—182, figs. 1—3—Kap Tial, Hitu, North Amboin.

Ptychodon celebica B. Rensch, 1932, Zool. Jahr., Syst., 63: 101—Sumba; 1935, Sitz.-Ber. Gesell. Naturf. Freunde, Berlin, 1935: 322—Timor; van Benthem Jutting, 1952, Treubia, 21, (2), pp. 399—400, fig. 63—Java; 1953, Treubia, 22, (2), pp. 302—303—Ambon (synonymizes *kobelti* and *celebica*).

Range.—Philippines (Luzon, Cebu, Mindanao, Negros, Leyte, and Catanduanes), Java, Sumba, Timor, Celebes, and Moluccas (Banda, Saparua, and Ambon).

Material.—Manila, Luzon (UMMZ 11496 ex Stearns; UMMZ 136773 ex Walker, Ponsonby); Negros (UMMZ 136771 ex Walker, Quadras); Sitio Angay, Inopacan, Leyte (UMMZ 136772 ex Walker, Quadras); Catanduanes (CNHM 46460 ex Webb, Quadras); Province Isabella (CNHM 18888 ex Ammen); Mt. McKinley, Davao, Mindanao (CNHM 57195 collected by Werner).

Remarks.—Comparisons of the figures in Pilsbry (1892) and van Benthem Jutting (1952) suggested that *celebica* and *philippinensis* are distinct species. The latter has a slightly elevated spire and a wider body whorl, and the palatal denticles are placed lower in the aperture. All of the Philippine specimens seen, however, have the flat spire and tooth positions of the Javanese shell

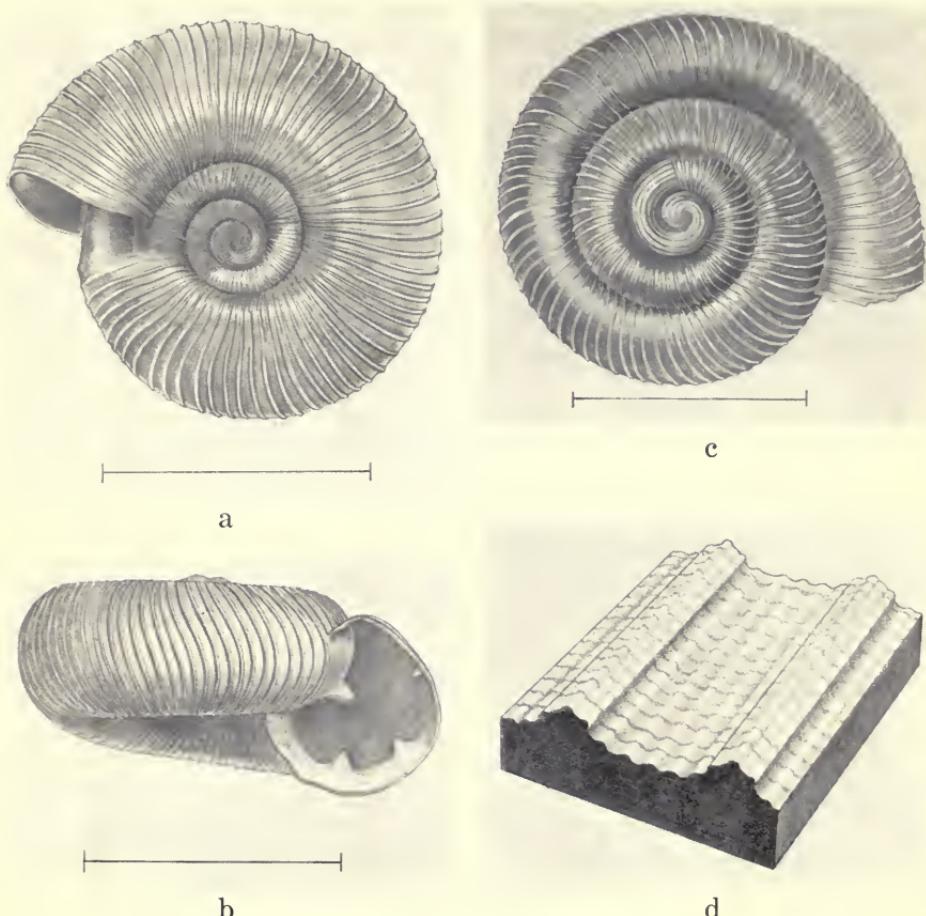


FIG. 3. *Beilania philippinensis* Semper, CNHM 46460. *a*, basal view; *b*, side view; *c*, top view; *d*, diagram of microsculpture (greatly enlarged). Scale lines=1 mm.

figured by van Benthem Jutting (1952). Probably the two sets of figures only represent extremes of individual variation. Semper's original material came from the mountains of Luzon and an elevated spire in montane populations is a common occurrence among land snails. At most *philippinensis* could be restricted to the high mountain race on Luzon, and *celebica* used for the lowland specimens. The high-spired form is not considered to be taxonomically significant and *philippinensis* is used for the entire species.

Genus **Stenopylis** Fulton, 1914 (= **Coarctatio** Haas, 1945)

Type species.—*Planispira hemiclaua* Tate, 1896.

The generic position of *Stenopylis* is still uncertain. Early authors referred specimens to *Plectopylis* (Corillidae), *Brazieria* (Ariophantidae), *Polygyra* (Polygyridae), and *Microphyura* (Rhytididae). Hedley (in Tate, 1896) figured the radula and jaw of a specimen and suggested that it might be a very primitive endodontid. Fulton (1914) described *Stenopylis* as an endodontid genus, and later Thiele (1931, p. 569) made a subfamily and Iredale (1937, p. 1) a family for the genus. Haas (1945, p. 13) suggested it might be either an endodontid or a streptaxid, but the jaw and dentition exclude the latter possibility.

The only land snail genera at all similar to *Stenopylis* are two from the eastern United States, *Helicodiscus* and *Polygyriscus*. Both have the same peculiar whorl formation, spiral sculpture, and apertural dentition. *Polygyriscus* has an aperture even more modified than that of *Stenopylis*, but the aperture of *Helicodiscus* is undistorted. Despite the much greater size of the North American genera, *Stenopylis* can probably be associated with them in the endodontid subfamily Helicodiscinae.

The minute size, hidden apertural armature, poor illustrations, and extraordinarily wide geographic range have created much confusion as to the extent of speciation in *Stenopylis*. Four specific names have been proposed. Fulton (1914) recognized three species, which Rensch (1932, p. 103) later united. Study of over 200 specimens from all parts of the range failed to reveal any characters by which more than one species could be recognized. Philippine and Australian specimens are identical in apertural dentition and sculpture. There is some variation in the height of the spire, and, co-ordinated with this, in the depth of the umbilicus. Some of the Philippine specimens are about 0.1 mm. smaller than the Australian and Solomon Island shells, but the difference is not large enough to be significant. On the basis of shell structure only one species can be recognized.

***Stenopylis coarctata* Moellendorff. Figure 4, a-e.**

Plectopylis coarctata Moellendorff, 1894, Nachr.-Bl. deut. Malak. Gesell., 26, (7-8), p. 113—Panglao, Philippine Islands (August); Faustino, 1930, Philippine Jour. Sci., 42, (1), p. 116—Bohol.

Planispira hemiclaua Tate, 1894, Trans. Roy. Soc. S. Australia, 18: 192—central Australia (November).

Brazieria coarctata Moellendorff, 1895, Nachr.-Bl. deut. Malak. Gesell., 27, (9-10), p. 159; 1898, Abhl. Naturf. Ges. Görlitz, 22: 123.

Brazieria coarctata var. *majuscula* Quadras in Moellendorff, 1895, Nachr.-Bl. deut. Malak. Gesell., 27, (9-10), p. 159—Masbate.

Micropyura hemiclauza Tate, 1896, Rep. Horn Exp. central Australia, Part II, Zoology, pp. 185-186, pl. 17, fig. 1; pp. 221-222, fig. c (anatomy)—MacDonnell Range, central Australia.

Helix (Polygyra) microdiscus Bavay, 1908, Nova Guinea, Zool., 5: 283, pl. 14, fig. 10, a-d—Humboldt Bay, New Guinea.

Stenopylis coaretata Fulton, 1914, Ann. Mag. Nat. Hist., (8), 14: 163-164 (lists *microdiscus* Bavay and *hemiclauza* Tate as distinct species); B. Rensch, 1932, Zool. Jahr., Syst., 63, (1), p. 103—Sumba; 1935, Sitz.-Ber. Gesell. Naturf. Freunde, Berlin, 1935: 322—Timor; van Benthem Jutting, 1941, Arch. Neerland. Zool., 4: 300-301, figs. 2-3—satellite islands of Java; 1952, Treubia, 21, (2), pp. 405-406, fig. 68, a-c.

Stenopylis hemiclauza Fulton, 1915, Proc. Mal. Soc. London, 11: 236; Iredale, 1937, Austral. Zool., 9, (1), pp. 1-2; 1937, S. Austral. Nat., 18, (2), pp. 26-27, pl. 1, fig. 20.

Micropyura microdiscus Odhner, 1917, Kungl. Svensk. Vetens. Handl., 52, (15), pp. 99-100—Chillagoe Caves, Queensland (on p. 114 *hemiclauza* and *microdiscus* synonymized on the authority of Charles Hedley).

Coarctatio coarctata Haas, 1945, Fieldiana, Zool., 31, (2), pp. 10-13, fig. 1, a-e.

Range.—Philippines (Masbate, Panglao, Bohol), Java, Sumba, Timor, New Guinea, Australia (Central Mountains to Cape York and Cardwell in Queensland), and Florida Island, Solomon Islands.

Material.—Maho, Masbate, Philippine Islands (CNHM 36630 ex Webb); Masbate (UMMZ 137439 ex Walker, Quadras; UMMZ 137440 ex Walker, Ponsonby, Quadras; CNHM 17664 ex Ammen; CNHM 36628 ex Webb, Gude, Sowerby and Fulton; CNHM 46501 ex Webb); Ladao, Masbate (CNHM 17975 ex Webb, Quadras); Panglao, Philippine Islands (CNHM 17663 ex Ammen; CNHM 36629 ex Webb, Gude); Halavo, Florida Island, Solomon Islands (CNHM 55189 ex UMMZ, Kuntz; UMMZ); central Australia (UMMZ 75864 ex Walker, Rush; UMMZ 137444 ex Walker, Ponsonby); NW MacDonnell Range, Northern Territory (UMMZ 137443 ex Walker, Ponsonby, Bednall); Larapinta, central Australia (UMMZ 137442 ex Walker, Ponsonby); Maroon, Batavia River, Cape York, Queensland (UMMZ 137441 ex Walker, Ponsonby, Hedley); Burachin River, Queensland (UMMZ 68146 ex Walker, Ponsonby); Queensland (CNHM 46341 ex Webb).

Remarks.—The great geographic range of *Stenopylis coarctata* would normally suggest that many of the records are the result of introductions, but its presence in the interior mountains of Australia in the 1890's is strong evidence in favor of its relict status. Most living specimens have been found in leaf mold under very moist conditions, a habitat not conducive to accidental transport. Despite intensive collecting on the oceanic islands, *Stenopylis* has

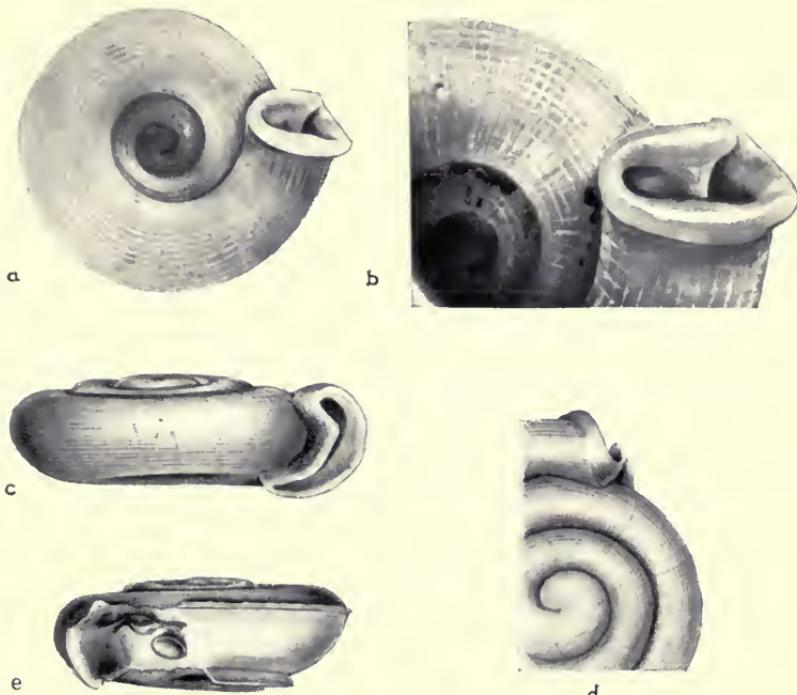


FIG. 4. *Stenopylis coarctata* Moellendorff, CNHM 17663. *a*, basal view; *b*, detail of base; *c*, side view; *d*, top view; *e*, interior of aperture. *a*, *c*–*e* $\times 25$; *b* $\times 50$.

only been found on unquestionably continental islands—further evidence against its being an introduced species.

The apertural tooth structure (see fig. 4, *c*, reproduced from Haas, 1945) is the same in both Philippine and Australian shells. The size of the two lamellae and the prominence of the nodule on the upper one vary widely, but individually. The only difference between the Australian and Philippine specimens is that the spire is slightly more elevated in some Australian shells. The value of this character in pulmonate systematics is dubious, and, on the basis of identical sculpture and apertural dentition, the Australian and Philippine populations are not here separated subspecifically.

SUMMARY

Two of the four Philippine endodonts, *Stenopylis coarctata* Moellendorff and *Beilania philippinensis* Semper, are widely distributed in Indonesia and the Philippines. *Stenopylis* is also found in

eastern Australia and Melanesia, but *Beilania* probably is not found south of New Guinea or east of the Bismarcks. The other two species, *Discocharopa aperta* Moellendorff and *D. wernerii*, n. sp., are restricted to the Philippines. *D. aperta* is found on several islands and is closely related to a common Indonesian species, *D. microdisca* van Benthem Jutting. *D. wernerii* is known only from Mindanao and is an aberrant member of the genus.

The species all belong to wide-ranging genera of the Indo-Australian region, but none of the genera are found on the islands of Micronesia and Polynesia. It seems probable that the Philippine species and their generic relatives represent relicts, which, because of their minute size and probably specialized habitat, have not been replaced by the more advanced zonitid taxa. In contrast, the larger endodontids are now restricted to the fringes of Melanesia, "oceanic" islands of the Pacific, and the Austro-Zealandic region.

REFERENCES

FULTON, HUGH
1914. On *Stenopylis*, a proposed new genus of the Endodontidae. *Ann. Mag. Nat. Hist.*, (8), 14: 163-164.

HAAS, FRITZ
1945. Malacological notes—IV. *Fieldiana, Zool.*, 31, (2), pp. 3-14, 2 figs.

INGER, ROBERT F.
1954. Systematics and zoogeography of Philippine Amphibia. *Fieldiana, Zool.*, 33, (4), pp. 183-531, 50 tables, 98 figs.

IREDALE, TOM
1937. A basic list of the land Mollusca of Australia. Part II. *Austral. Zool.*, 9, (1), pp. 1-39, pls. 1-3.

PILSBRY, HENRY A.
1892. *Man. Conch.*, (2), 8, 314 pp., 58 pls.

RENSCH, BERNHARD
1932. Die Molluskenfauna der kleinen Sunda-Inseln Bali, Lombok, Sumbawa, Flores und Sumba. II. *Zool. Jahr., Syst.*, 63, (1), pp. 1-130, 56 figs.

TATE, RALPH
1896. Report. Horn Expedition to central Australia. Part II. *Zoology, Mollusca*, pp. 181-226, pls. 17-19, 16 figs. (anatomy by Charles Hedley).

THIELE, JOHANNES
1931. *Handbuch des Systematischen Weichterkunde*, I, part 2.

VAN BENTHEM JUTTING, TERA
1952. Systematic studies on the non-marine Mollusca of the Indo-Australian Archipelago. III. *Treubia*, 21, (2), pp. 291-435, 89 figs.

UNIVERSITY OF ILLINOIS-URBANA



3 0112 027924288